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The impact of certification on the natural and financial capitals of Ghanaian cocoa farmers

Abstract

While an increasing number of large food companies commit themselves to source only certified cocoa, research on the impacts of certification on cocoa farmers is falling behind. We investigate how Rainforest Alliance (RA) certification of small-scale cocoa farmers in Ghana has affected both the financial and the natural capitals of the farmers. Across two villages, certified farmers were compared to conventional farmers, using both qualitative and quantitative data collected through farmer and key informant interviews and participatory rural appraisals. A combination of the Sustainable Livelihood Framework and the Input-Output-Outcome-Impact Framework was used for the analysis. Results indicate that the RA certification scheme has a positive influence on the certified farmers in terms of cocoa production, yield, income and farmers' perception of changes in their natural and financial capitals. The positive influence is a result of inputs from the RA certification, including financial support, information and knowledge, technical assistance, and increased access to farm inputs and credit. However, these positive impacts are conditioned by the presence of active farmer organizations and access to agricultural inputs and credit through associations and government institutions, and may be undermined by certified farmers who sell their produce outside the premium value chain.

Keywords: cocoa, certification, livelihood capitals, Ghana

Farmer capitals and certification in Ghana

1. Introduction

1.1. Cocoa farming in Ghana

From 1925 to 1976 Ghana was the world's largest producer of cocoa, *Theobroma cacao L.* (Jukofsky 2001). However, production dropped to its lowest level in 1983-84 due to aging trees, widespread disease, drought, low producer prices and the alleged smuggling of exportable beans into Côte d'Ivoire (Kolavelli and Vigneri 2011). In response, the

government embarked on a comprehensive process to reform the domestic cocoa sector beginning in the 1984/85 season. This included improving extension services, replacing old cocoa trees with hybrid high-yielding varieties, offering fertilizer subsidies, running mass spraying programs, making improvements to the road network, and shifting responsibility for cocoa procurement from the government-controlled Ghana Cocoa Board (COCOBOD) to privately licensed buying companies (LBCs) (Kolavelli and Vigneri 2011). Further efforts to increase yields include the government promotion of low-shade, intensified systems to replace the common extensive shaded production (Gockowski et al. 2013). Since 1983 cocoa production has quadrupled due to both higher yields and a large expansion of cocoa areas, and according to forecasts for 2015/16 Ghana has an 18.6 % share of the global production of 4.2 million tons (ICCO 2016). Due to the high quality of bulk cocoa produced in Ghana, the country enjoys a price premium of 7 - 10 % on the world market (Gockowski et al. 2013). Furthermore, COCOBOD has developed a system that buffers farmers from volatilities in world market prices by annually fixing the producer price for bulk cocoa based on the futures market (Laven 2010; Kolavelli and Vigneri 2011).

Despite the reforms and the price premium on the world market, most Ghanaian cocoa farmers are currently struggling with low yields compared to producers in other countries, as well as low income, a lack of training and an inability to finance or access the inputs necessary to improve their production and thus their livelihoods (Paschall and Seville 2012; Fountain and Hütz-Adams 2015). More than 700,000 farmers are involved in cocoa farming in the southern part of Ghana and almost a third of the population depends on the cocoa sector for their livelihood (Laven 2010; Kolavelli and Vigneri 2011).

An increase in the demand for cocoa has almost tripled global production since 1983 to 4.4 million tons in 2014 (ICCO, 2016), mainly by including more areas under production (Nkamleu et al. 2010). This has led to the near disappearance of the West African rainforest,

which covers part of Ghana and provides timber, non-timber forest products (NTFP) and essential ecosystem services on which smallholders rely (Nkamleu and Ndoye 2003). The conflict between the economic opportunity that cocoa represents for the mainly small-scale Ghanaian cocoa farmers, of which about one quarter live in poverty, and the adverse environmental impacts associated with cocoa production emphasizes the need to revitalize the cultivation of cocoa and place a specific emphasis on environmental issues (Nkamleu et al. 2010; Potts et al. 2010).

1.2. Certified cocoa production

A number of raw agricultural commodities, including cocoa, are produced in tropical areas, but largely processed and consumed in Europe and North America (Fold 2002; Fountain and Hütz-Adams 2015). In these global agricultural value chains, environmental and social standards in the primary production have become important for driving sustainability and CSR issues forward, governing complex value chains, and marketing of products as sustainable (Williams et al. 2009; Lee et al. 2012; Nelson and Tallontire 2014; Schouten and Bitzer 2015). In this regard, certification has emerged as a useful tool. Standard bodies advise farmers on how to implement better long-term farming practices and establish protocols for adhering to environmental and social standards, while certification and accreditation bodies implement auditing and third-party verification of farmers' standard compliance, thereby creating a necessary level of assurance for consumers as well as for companies sourcing the commodities.

Certified cocoa is increasing on the world market: today an estimated 30 % of the world production is certified under UTZ Certified, Fairtrade International or Rainforest Alliance, up from 3 % in 2009 (Potts et al. 2014; Fountain and Hütz-Adams 2015). This figure is likely inflated 30-50 % due to double or triple certification of part of the production (Fountain and Hütz-Adams 2015). Despite the growing use of certification schemes in agricultural value

chains, the latest edition of the State of Sustainability report continues to call for a better understanding of the field-level impacts of certification (Potts et al. 2014). Coffee stands out from other tropical agricultural commodities, as it has received the bulk of attention in certification impact studies in the recent decade. The studied impacts include income and productivity (Kilian et al. 2006; review by Mendez et al. 2010; review by Blackman and Rivera 2011; Ruben and Fort 2012), environmental effects (Blackman and Naranjo 2012), greening of agricultural practices (Elder et al. 2013; Snider et al. 2016), as well as broader livelihood aspects and social and rural development (Bacon et al. 2008; Valkila and Nygren 2009; Rijsbergen et al. 2016), to name but a few. Only in the last few years are studies on cocoa starting to catch up and results indicate that certification of cocoa farms may alleviate social issues such as child labor, enable farmers to organize themselves, and improve producer prices, production practices, yield and quality (Laven 2010; Basso et al. 2012; Potts et al. 2014). One of the certification schemes has been developed by the Rainforest Alliance (RA), a standard body in the Sustainable Agriculture Network (SAN) founded in 1986. The RA certification scheme focuses on biodiversity conservation and social issues, and is based on the SAN Agriculture Standard that is built on ten guiding principles (SAN 2010). For the specific case of Ghanaian cocoa, the standard is accompanied by Ghana-specific criteria and indicators (SAN 2009). In a study of different cocoa production systems in Ghana, Gockowski et al. (2013) find that RA certified cocoa farms in Ghana maintain environmental services more effectively than government-promoted intensified full-sun systems, and produce a higher yield and are more profitable than the traditional and widespread extensive shade systems. Other studies from Côte d'Ivoire and Ghana also show that RA certified cocoa farmers acquire a better understanding of the natural ecosystem, adopt good agricultural practices (GAP) including applications of agrochemicals, and achieve higher production and quality (Krain et al. 2011; Paschall and Seville 2012; Owusu-Amankwah et

al. 2014). This, together with the strong organization of farmers and improved access to education, water resources and infrastructure projects, has led to an improvement in living conditions among farmers (Paschall and Seville 2012). For a longer term study, Ingram et al. (2014) started a base-line study of certified cocoa farmers in 2013, including a first evaluation of the impact on farmers' knowledge and added value. Besides the positive impacts, studies of RA certified farmers also document high start-up costs during the certification process and increased costs of cultivation and farm administration, leading to concerns as to whether certification is an option for small-scale farmers with limited economic means (Krain et al. 2011; Basso et al. 2012).

1.3. Objective

Until now, only a few studies have explored cocoa certification's impact on the natural and financial capital of Ghanaian farmers. One of the difficulties of assessing the impacts of cocoa certification standards is the limited empirical data available on the long-term impacts of certification on the environment and farmers' livelihoods, simply due to the relatively short lifespan of certification schemes to date. Given that Ghana is one of the leading cocoa producers in terms of quality and quantity, this paper aims to contribute to closing the knowledge gap regarding impacts on the natural and financial capitals of cocoa farmers based on an assessment of RA certified small-scale cocoa farmers in Ghana. The paper describes the relevance of an environmentally oriented cocoa certification scheme in the Ghanaian cocoa context and discusses whether similar positive impacts could be achieved outside a certification scheme.

2. Methods and study area

2.1. Study site

Two villages were selected in the Assin North District in the Central Region of Ghana (Figure 1). In one of the villages, Nkranfum, all the cocoa farmers are RA certified, while in

the other, Akofudi-Abuoho, none are certified. The two villages were selected for this study based on the following criteria: i) all the cocoa farmers are small-scale producers, with cocoa representing their main source of income, ii) the farmers' are situated in similar agro-ecological settings and have mature cocoa cultivation systems, and iii) the RA certified farmers have been certified for at least two years. The village of Nkranfum is part of the initiative Mars Partnership for African Cocoa Communities of Tomorrow (iMPACT), which is being run in collaboration with RA and aims to certify 10,000 farmers in 40 communities in Ghana and Côte d'Ivoire (Toose et al. 2013). iMPACT is part of a commitment by the global food manufacturer Mars Inc. to have its entire cocoa supply sustainably certified by 2020 (Mars Inc. 2013). Akofudi-Abuoho is located 7 km from Nkranfum, outside the area involved in iMPACT, which prevents any spill-over effects from the project and RA certification, but have similar agro-ecological conditions and cocoa farming history. Both villages are located 120 m.a.s.l. in the tropical rainforest agro-ecological zone, with approximately 1,400 mm annual rainfall and a bi-modal rainfall pattern (FAO 2005).

[Figure 1 here]

Figure 1 Map showing study locations in Akofudi-Abuoho and Nkranfum in the Assin North District of the Central Region of Ghana. The circle indicates the area of the iMPACT project

2.2. Methodology

Without the possibility of observing changes over time for the same individual farmers with and without certification, for obvious reasons, the counterfactual thinking in this study is based on the selection of the two communities of Nkranfum and Akofudi-Abuoho, representing cases of RA certified and conventional farmers. The comparison of the two villages meets similar challenges experienced in previous studies of certification and other policies, such as confounding factors and self-selection, as discussed by Blackman and Rivera (2010) and Ferraro (2009). Eight villages inside the iMPACT project area, among these Nkranfum, were initially presented to the iMPACT project and invited to participate.

All villages accepted. This situation resembles many certification processes, where NGOs or other project organizations initiate and assist the certification of farmers. The parameters included in the comparison of farmers in the two villages are all RA targeted outcomes and are not covered by iMPACT activities.

In this study, we define natural livelihood capital as the natural base from which resources flow and services useful for livelihoods are derived, while financial capital is the capital base of economic assets that are essential for the pursuit of any livelihood strategy. In the investigation of natural capital, the focus is on seven relevant principles out of the ten guiding principles defined by SAN (SAN 2010): i) social and environmental management system, ii) ecosystem conservation, iii) wildlife protection, iv) water conservation, v) integrated crop management, vi) soil management and conservation, and vii) integrated waste management. Likewise, in the study of financial capital, the focus is on i) income, ii) savings, iii) investments, iv) financial management and v) external support (SAN 2010). Other crucial challenges related to certification and social issues, such as land tenure, power relations, working conditions, human rights and demographic factors, do not fall within the scope of this study, but can be found elsewhere, e.g. Barrientos et al. (2007) and Fountain and Hütz-Adams (2015).

Both qualitative and quantitative data were collected from cocoa farmers and stakeholders with whom farmers are in direct contact, using a broad array of methods. A personal interview survey was conducted with 15 randomly selected farmers among participants in village meetings in each village (two thirds men and one third women). The interview contained questions related to the SAN criteria and indicators on farm management for the 2012/13 cocoa season and five years earlier when farmers in Nkranfum had not yet been certified. Additional questions were related to household characteristics, farmer organization and certification issues. The use of retrospective questions and recall data presents

methodological challenges, such as uncertainty in answers. Questions regarding SAN indicators were posed as relative changes as experienced and perceived by the farmers, while questions regarding production were for annual amounts which have been shown to produce less recall bias than disaggregated numbers (Nakata et al. 2009). In some cases, numbers on production and land area could be supported by records.

Focus group discussions regarding community timelines and land use analysis were conducted with six to seven men in each of the villages, providing information on significant episodes for the community in addition to trends in land use changes. The same men also identified the most pressing problems within the community in a problem analysis exercise. In both villages seven to nine women discussed and produced a seasonal calendar of agricultural practices and financial activities, providing information concerning the timely distribution of farming activities, labour, income and expenditure over the course of a year. They also sketched a flow diagram of the farming system, giving an overview of the interrelations within and outside the farming systems. Data from stakeholders outside the villages were collected through semi-structured interviews with representatives from the Agro Eco - Louis Bolk Institute (AELBI), which is a local RA partner, and the International Institute of Tropical Agriculture (IITA), a research institute that contributed to the formulation of RA guidelines in Ghana.

The analysis of the impacts on farmers' capitals was undertaken in an analytical framework that combined the Sustainable Livelihood Framework (DFID, 1999) and the Input-Output-Outcome-Impact (IOOI) model in order to detect which components of the certification scheme have the greatest impact (DAC 2001; van Rijn et al. 2012). The IOOI model differentiates between short and long-term impacts in addition to direct and indirect impacts. The inputs can then be linked to the specific actions of outputs producing immediate outcomes and impacts defined as longer-term changes.

Student's t-test and the χ^2 -test for ordinal data were used to test whether the various characteristics of the certified farmers are significantly different from the conventional group at the significance levels 0.05 and 0.10. Due to the low number of observations limiting the statistical validity, all results are supported by and interpreted in combination with the qualitative data.

3. Results and discussion

3.1. The influence of RA certification on natural and financial livelihood capitals

Examination of baseline data

Table 1 contains summary statistics of the survey data and shows which household and farming variables differed significantly between the certified and conventional farmers. The main differences are found in share-cropping arrangements and level of education. A larger proportion of the conventional farmers are engaged in the *Abunu* system, where the produce is shared equally between the farmer and the landowner, while more of the certified farmers are sharing their produce two-thirds-to-one with the landowner in the *Abusa* system. These arrangements have been shown theoretically as well as empirically with data from Ghana to reduce farmers' investment in farm maintenance and productivity (Abdulai et al. 2011); an issue that is possibly more pronounced in the *Abunu* system. The certified households had a significantly higher mean of people with a senior high school education and a lower mean of people with no education. This difference in education could affect farming practices and productivity as well as be related to economic means including land holdings. However, this does not seem to be the case based on the production figures and land holdings five years prior to the study. The two groups of farmers did not differ significantly in other baseline household variables and the environmental conditions are the same in both areas, which indicates that conditions for both communities were in many aspects similar before the RA certification of the Nkranfum farmers.

[Table 1 here]

TABLE 1 Descriptive statistics of the household head (HHH), the household and the cocoa farm. * = significant difference $p < 0.10$; ** = significant difference $p < 0.05$.

In terms of cocoa production, certified farmers have increased their yield and total production in the period 2007 to 2013, while the conventional farmers have experienced a reduction in both. In 2012/13 the difference in yield and production is significant between the two groups. The certified farmers had a significantly higher number of cocoa plots, but there was no difference in the total area of the cocoa farms, which indicates that the certified farmers had more smaller-sized plots than the conventional farmers. It is likely that the certified farmers had better knowledge of their farm sizes since areas are measured during the certification process, whereas the conventional farmers might have overestimated their farm size, as is often the case among farmers (Hainmueller et al. 2011; Ingram et al. 2014). If the conventional farmers did indeed overestimate their farm sizes, this could explain part of the very significant differences in yield.

There are no summary statistics of financial variables because the farmers were not asked about these directly. However, the significant difference in the production numbers indicates that the gross income from cocoa of the certified farmers was significantly higher than for the conventional farmers in 2012/13, even more so when taking into account that the certified farmers received a premium price of 8 Ghana Cedi GHS (~2€) per 65 kg bag for their 2012/13 production on top of the conventional price of 205 GHS/bag (~50€). On the other hand, certified farmers generally have additional expenses related to RA certification audits and control, greater use of different agricultural inputs and more administrative efforts (Krain et al. 2011; Basso et al. 2012).

Changes in farmers' natural capital

The farmers reported substantial differences in changes to the natural capital over the past five years (see Figure 2). The certified farmers mentioned positive changes, especially in

relation to increased water quality, increased soil fertility, better condition of the forest, increased availability of bushmeat, and improved air quality. Additional perceived positive developments were related to crop production, livestock, biodiversity, and soil erosion. Only a few certified farmers mentioned negative changes in soil fertility, water quality and the availability of bushmeat. In comparison, the majority of the conventional farmers mentioned negative changes exclusively or no change, while only one farmer found positive changes in water quality and the state of the forest (Figure 2). The overly positive responses by the certified farmers may be influenced by the questions being based on SAN criteria, which therefore could resemble questions in a RA audit. We attempted to avoid this by asking specifically about the state of the natural capital and not about practices. Nonetheless, their responses could be biased by an incentive to appear in compliance with the RA standard and a general desire to acknowledge RA certification positively. Even with the possible biases in farmers' responses, the positive changes in natural capital as perceived by the certified farmers contrasted greatly with the conventional farmers' perception of the negative changes.

[Figure 2 here]

Figure 2 Main topics of changes mentioned by the farmers in their natural capital when comparing 2007/08 to 2012/13. Variables are based on optional statements to an open-ended question in the interviews with 15 certified and 15 conventional farmers and the scale shows counts. + indicates an increase or improvement in the condition, and - indicates a decrease or deterioration.

[Table 2 here]

Table 2: Overview of changes in the natural capital of farmers comparing 2012/13 with 2007/08 in relation to the relevant SAN-principles: + indicates a positive change, - indicates a negative change, while 0 indicates no change.

Table 2 presents the fieldwork results in relation to the defined natural and financial capitals and the relevant SAN principles. In order to obtain and maintain RA certification, farms must comply with at least 50 % of the applicable criteria of each principle and at least 80 % of the total applicable criteria (SAN 2010). Clear differences were found in the *social and environmental management system*. In order to deliver the traceability and transparency of cocoa production in addition to keeping track of income and expenditure, all 30 farmers interviewed kept records of production and sales in 2012/13. The conventional farmers

maintained the same level of record keeping as five years ago, whereas the certified farmers have since then added recordings regarding inputs such as fertilizers, pesticides and pruning. With regard to storage and the final disposal of agrochemicals, the certified farmers have gone from primarily storing the chemicals in the kitchen or bedroom of their houses, or less commonly spraying the remains onto the soil surface or into a river, to storing them in special storage rooms or on the farm. There has been no change in the conventional farmers' management over the five-year period; they continue to store and dispose wastes in an undesirable way.

Assessing *ecosystem conservation* within the five-year period, neither the certified nor conventional farmers have expanded their cocoa production area by clearing forest, though this has been found to be the preferred method for cocoa expansion (Asare et al. 2016). Instead they have converted former farmland or rehabilitated older cocoa farms. All the certified farmers have reduced the frequency of burning during the five year period in order to meet the standard, whereas the conventional farmers all stated not having used burning at all in the investigated time period. This is also relevant for the *soil management and conservation* principle, which declares that burning for land preparation is not allowed. The RA/SAN standard for Ghana requires establishment of agrochemical-free vegetation barriers along farm boundaries and frequently-travelled roads, which all the certified farmers had created where necessary, whereas the conventional farmers had not.

RA advocates the use of shade trees in cocoa production and the standard for Ghana specifies that farmers must have at least 12 different native tree species/ha and maintain a shade density of 40 % at all times, equivalent to 20 shade trees/ha (SAN 2009). The certified farmers all stated to have increased the number of native trees on their farm during the five year period and to comply with the shade density target. In contrast, most conventional farms had only four to five shade trees/ha, while a few had 10-15 trees/ha, and less than 40% shade.

The conventional farmers explained that they cut down shade trees because of the competition with cocoa trees for nutrients and water, a decreasing yield caused by excessive shade, black pod disease, capsids, as well as for charcoal production and sale of timber for a quick cash income. Overall, the certified farmers experienced an increase in the number of shade trees on their farms, whereas the conventional farmers saw no change or a decrease. As regards *wildlife protection*, which in this study is represented by changes in the availability of bushmeat, the answers differed clearly: the certified farmers stated ‘higher-much higher’, whereas the conventional farmers answered ‘lower-much lower’. The majority of both certified and conventional farmers previously hunted more wild animals, such as grasscutter, rat, snail, squirrel, lizard, turtle and duiker. However, the certified farmers stated to hunt less today due to the prohibitions in the RA indicators, whereas the conventional farmers mentioned lower prevalence of wildlife as the reason.

In order to minimize the leaching of agrochemicals into water bodies, compost and other applied organic materials, it is considered good agricultural practice (GAP) in *water conservation* to have an agrochemical-free zone near rivers and other water bodies. Likewise, wastewater management has been improved by filtering wastewater through a hole in the ground containing sand and rocks before it runs into natural water bodies. In this regard the certified farmers have improved their management, while the conventional farmers have not. Pests and diseases pose some of the greatest risks in the Ghanaian production of cocoa (World Bank 2011), which is why *integrated crop management* is a crucial measure. A survey of farmers in four Ghanaian regions reported GAP, the additional use of chemicals and the implementation of a public mass spraying program as the main reasons for the production increase in the 2003/04 season (Laven 2010). Both certified and conventional farmers rely on the government-sponsored mass spraying exercise to control diseases such as black pod and pests such as capsids. However, both groups of farmers indicated timing as a

major problem in relying on the government's spraying regime. The conventional farmers ranked it as the fourth major problem during the problem analysis and the certified farmers also mentioned it several times. In order to complement the government's efforts to reduce the pressure of diseases, all 30 farmers mentioned the removal of black pod-infected cocoa pods as a way of stopping the disease from spreading. The certified farmers claim to have increased this practice 'much more', whereas the conventional farmers stated they did the 'same' as five years ago. In addition to removal, certified farmers bury diseased pods far away from their farms as an effective way of stopping the spread of the black pod disease, a practice that was directly promoted by RA training and uncommon among the conventional farmers. A study of an RA project in Côte d'Ivoire showed that by introducing these practices of fighting black pod, both the quantity and quality of cocoa increased (Krain et al. 2011), which may be part of the reason for the increased yield and production in Nkranfum. Another difference in practices is found in weeding. The conventional farmers weeded two to three times a year throughout the period, while the certified farmers had increased weeding from once or twice a year to three or four times a year. The greatest weed pressure comes from mistletoe.

In evaluating *soil management and conservation*, certified farmers stated that they had experienced a large positive change in the soil fertility of their farms compared to five years ago, while conventional farmers indicated the contrary. This is likely related to the use of fertilizers, as there has been a general increase in the use of both inorganic and organic fertilizers over the past five years, with certified farmers recording the greatest increase. Affordability remains the main reason for this; conventional farmers stated a lack of income as a major obstacle for purchasing inorganic fertilizers. Similar to the issue related to timely spraying, the certified farmers also face the problem of not receiving fertilizers in time; they need them earlier in the season in order to apply them before the peak rainy season to avoid

leaching. Furthermore, issues with soil erosion (also relevant in the *ecosystem conservation* principle) have decreased according to the certified farmers, whereas conventional farmers still find it to be a problem (Figure 2).

With regard to *integrated waste management*, the certified farmers reported that they no longer leave plastic waste on the ground but bury it. According to their own statements, conventional farmers continue to leave plastic waste on the ground or burn it.

In relation to improved cocoa planting materials, both certified and conventional farmers have access to quality hybrid materials from the Seed Production Division (SPD) of COCOBOD. However, through RA training the certified farmers have better access to these materials as well as more knowledge regarding their management than the conventional farmers. The training also involves establishing new cocoa farms and the thinning and pruning of cocoa trees, shade trees and other trees on the farms. This has led to more frequent thinning and pruning as well as a higher uptake of improved hybrid seed material among certified farmers compared to the conventional farmers.

In summary, the group of certified farmers have experienced only positive changes in the natural capital and farming practices related to the SAN principles and the additional RA incentives, whereas the conventional farmers have experienced either no change or negative changes. This corresponds to finding in earlier studies of certification, where specifically changes in practices related to increased access to training is emphasized (Elder et al. 2013; Snider et al. 2016)

Changes in farmers' financial capital

Figure 3 shows the changes in the farmers' financial capital from 2007/08 to 2012/13 as stated by farmers during interviews. The conventional farmers in Akofudi-Abuoho only mentioned negative changes, highlighting reduced cocoa production and lower income. In contrast, the certified farmers have experienced an increase in cocoa production, a higher

income, and the ability to pay off debts, save money and plan for income, savings and spending for a longer time span than before. Education expenses constitute a large proportion of total costs and it is viewed as a success when it is possible to send children to school. The high expenses of education threaten to limit access to quality education for the children of the conventional farmers in particular, which has been shown to adversely affect several livelihood dimensions, such as farming practices, business decisions, migration of the youth to urban areas, and generally hindering the future growth of cocoa farming (World Cocoa Foundation 2012).

[Figure 3 here]

Figure 3 Main topics of changes mentioned by the farmers in their financial capital when comparing 2007/08 to 2012/13. Variables are based on optional answers to an open-ended question in the interviews with 15 certified and 15 conventional farmers and the scale shows counts. + indicates an increase or improvement in the condition, and - indicates a decrease or deterioration.

[Table 3 here]

Table 3: Overview of changes in the financial capital of farmers comparing 2012/13 with 2007/08: + indicates a positive change, - indicates a negative change, while 0 indicates no change.

Table 3 gives an overview of changes in the defined financial capital comparing 2007/08 with 2012/13. The certified farmers mentioned a positive change in their income, probably as a result of increased cocoa production and access to premium prices, which is in contrast to the conventional farmers. Basso et al. (2012) and Ingram et al. (2014) also find that improved yields and market access translated into higher net cocoa incomes for certified farmers. However, a higher net income is needed to cover the costs associated with certification. The actual cost of production has not been recorded in this study, but the additional costs of certified production are assumed to be driven by the same cost items as described by Basso et al. (2012) and Ingram et al. (2014); extensive use of different inputs, more man-hours and greater administrative efforts. In the iMPACT project Armajaro Ghana Limited¹ is the only recommended LBC in order to simplify management and increase transparency. However,

¹ In November 2013 Armajaro Limited was bought by the Swiss company Ecom Agroindustrial Corp Ltd. that has continued the role of Armajaro in the iMPACT project.

five of the 15 certified farmers are selling part of their produce to LBCs outside the certified value chain. This was confirmed by the AELBI regional manager and project supervisor, who stated that around 30 % of the RA certified cocoa in the iMPACT Assin Fosu project is not sold to Armajaro (personal communication, 21 May 2013). According to the interviewed farmers, the reasons for selling to other LBCs included social relations with purchasing clerks, the need for fast cash when Armajaro buyers are not around, and outstanding debt with other LBCs. In some cases farmers have to take out new loans in order to pay back debts to former LBCs, thereby maintaining the need to sell to these LBCs. By circumventing the established marketing channel of certified cocoa through Armajaro, the farmers are, perhaps unknowingly, making the certification scheme financially vulnerable. The premium is fixed by RA at 5 % of the sale of certified cocoa in order to make the farmers' system economically sustainable, taking into account production expenditure and independence of external financial support. Thus, with no external financial support from the iMPACT project, the certification of farmers can only continue if the certified production is sufficiently high and sold on the premium price market, which means using Armajaro as the marketing channel.

In terms of *savings and investments*, the survey data showed a positive change for the certified farmers and a negative change for the conventional farmers. The changes are significantly different between the two groups (saving $p=0.0001$ and investments $p=0.035$) according to a χ^2 -test, even though the low number of observations limits the statistical strengths. The larger farm investments by certified farmers may also be influenced by a larger share having full ownership of their own land, whereas conventional farmers to a larger extent are involved in the Abunu sharecropping arrangement. However, as this was also the case before 2008, where conventional farmers stated to generally perform better in their cocoa production, it is unlikely that the different land tenure arrangement is the only factor

for changes in farm investments. There was no clear difference in the number of paid workers employed by the two groups, although the certified farmers claimed to have more workers now, while the conventional farmers have the same number now as they did five years ago. The changes in financial management were linked to the changes in keeping track of income and expenditure, as mentioned in the *social and environmental management system*, and take into consideration the fact that the majority of certified farmers, 12 of the 15, had a bank account in 2012/2013, while only four of the conventional farmers had one. The certified farmers received considerably more external support for cocoa production from the government and/or organizations than the conventional farmers. Besides shade tree seedlings, farmer training and personal protective equipment from RA and seedlings from the government, the support received by the certified farmers include fertilizers and cocoa seedlings at reduced prices sold by Armajaro and other LBCs. Only five of the conventional farmers had the opportunity to buy less expensive fertilizer from one of the LBCs and did not get any other type of external support. In summary, the certified farmers experienced only positive changes in their financial capital since 2007/2008, whereas the conventional farmers either experienced no change or negative changes. Despite the extra costs of running certified farms, the farmers seemed to experience a net economic benefit, which was also found at farm, cooperative and community level in a recent KPMG cost-benefit analysis of RA, Fairtrade and UTZ in Côte d'Ivoire and Ghana (Basso et al. 2012). The International Trade Centre (ITC 2011) also found the indirect financial benefits, such as increased yields, technical support and training, marketing guarantees, and improved access to credit, to outweigh the direct financial benefit of the price premium for the certified farmers.

3.2. IOOI: from inputs to the impacts of RA certification

By applying the IOOI model, the inputs from the certification process that have the most significant impacts on farmers' livelihoods can be identified. Figure 4 presents a flow diagram of the IOOI model. It presents the initial inputs for a development intervention, in this case certification, the specific activities carried out based on the inputs, and the resulting immediate tangible outputs in the form of products and services. The outputs lead to immediate outcomes and longer-term impacts, being either positive or negative and primary or secondary long-term effects produced by the development intervention, directly or indirectly, intended or unintended (van Rijn et al. 2012).

[Figure 4 here]

Figure 4 Assessment of the impacts of RA certification on the natural and financial capitals of the certified farmers. Collected fieldwork data integrated in an IOOI model.

The inputs, activities and outputs within the natural and financial capitals are identical. The inputs used in the RA certification producing the most significant impacts were identified by respondents as i) financial support, ii) information and knowledge about the certification of goods, the cocoa sector and project planning, iii) AELBI technical assistance, and iv) increased access to farm inputs and credit. The identified inputs are consistent with the findings of Nkamleu et al. (2010). The inputs have given rise to certain activities, where organization of farmers, through the establishment of the cooperative Cocoa Farmers Association, and farmer training provided by AELBI were identified as the two most important. The immediate outputs were an increase in knowledge of production, management and the financial system in addition to improved technical skills on cocoa cultivation and running a farm as a business. This was revealed in the PRA as farmers stressed that through the RA initiated farmer field schools, they have learned GAP and farming as a business, which has improved their record keeping and planning.

The last two parts of the process differ between the natural and financial capitals. With regard to natural capital, the outcomes were identified as a variety of GAP leading to impacts improving the condition of the environment, cocoa yield and growing of subsistence crops.

The identified outcomes of the financial capital were farm recording, economic planning and premium price when selling to Armajaro. The impacts were eventually increases in income, investments and organizational capacity.

Potts et al. (2010), using the Committee on Sustainability Assessment (COSA) methodology, and Ingram et al. (2014) found higher yields and higher net income from cocoa among certified farmers compared to conventional farmers. The increased net income among farmers was primarily due to higher productivity on the farm and not the premium prices (Potts et al. 2010; RA 2012; Ingram et al. 2014). As in this study, substantial improvements were seen in indicators such as yields, net income, training, community participation and use of soil and water conservation measures. In addition, Paschall and Seville (2012) found improvements related to the planting of shade trees, farm planning incorporating climate change adaptation, plus more children attending school, which also correlates with the findings in this study.

3.3. Factors limiting the positive impacts of RA certification

Several limiting factors related to the positive impacts of certification have been identified. Farmers do not sell all their certified cocoa to Armajaro, which implies a reduction in the total premium received to cover the farmers' extra costs of certified cocoa production. When farmers sell part of their production to other LBCs it risks undermining the set-up of the marketing of certified cocoa, since Armajaro is also foregoing an income by marketing less certified cocoa than anticipated.

Another limiting factor is lack of access to adequate amounts of agrochemicals and timely application, leading to a reduced cocoa yield. Similarly, lack of access to credit prevents both certified and conventional farmers from making investments aimed at improving cocoa

farming (Laven 2010; Basso et al. 2012), and makes it hard for farmers to cover the costs of RA standard compliance and auditing. Adequate access to inputs and credits require that certified farmers are connected with agro-input manufacturer, LBCs and banks, where farmers can take out loans to finance the initial phase of certification and farm investments, and purchase agro-inputs in the later phases of their certified production.

There is a risk that farmers are not able to carry out the activities necessary for RA standard compliance without the assistance of farmer-capacity-building institutions such as AELBI and externally funded projects like iMPACT. The need for such continuous external support has been highlighted as a serious weakness of cocoa certification projects (Krain et al. 2011). The expectation is that after the initial certification phase, the certified farmers should be able to manage everything themselves and only contact iMPACT partners for advice, which is the same exit strategy used in other Ghanaian iMPACT projects (Owusu-Amankwah et al. 2014). During the PRA, the certified farmers stated that even though they will be able to manage future challenges, they will still need technical support from AELBI and RA. In other RA/AELBI projects in the Ashanti Region, external audits and responses to non-compliance are issues that farmer cooperatives cannot handle independently. Farmers also continue to seek assistance with marketing of the certified cocoa. In order to make a certified cocoa project sustainable and beneficial, a strong entrepreneurial farmers' organization is an essential pre-condition (Laven and Boomsma 2012).

Another complication in extending the impact of RA certification is that RA on its own does not have the capacity for certifying more conventional farmers. Farmers need financial support in the initial phase to cover costs of training and the required farm investments. When large chocolate and food companies commit themselves to buy certified cocoa beans exclusively by 2020 (Fountain and Hütz-Adams 2015), the LBCs have to procure certified

beans to meet the demand. This should be an incentive for the LBCs to start supporting and investing in farmers to obtain certification.

In summary, the positive impacts of certification expressed by the certified farmers in Nkranfum are at risk of not being sustained in the longer run if farmers continue to sell part of their production outside the premium value chain and if farmers are not continuously supported in their efforts to meet the certification standard. In this regard, strong farmers' organizations are essential for continuous self-organized farmer-capacity-building as are additional training from extension services and access to inputs and credit.

3.4. Could similar positive impacts be achieved outside a certification scheme?

It has been argued via the IOOI model that the most significant identified inputs that enhance certification are not the premium prices paid to farmers but rather the influx of financial support, training on GAP, technical assistance, and access to credit and farm inputs. This is also the message from Blommer (2011), a stakeholder in the chocolate industry, who argues for collaborative models and a supporting regulatory and political framework in order to improve and sustain the cocoa sector; efforts that currently can only be found in Ghana (Blommer 2011; Glin et al. 2015). There have been several interventions in Ghana in this regard that have contributed substantially to cocoa farmers' livelihoods without the strict standards compliance found in cocoa certification. For instance, the cocoa hi-tech and mass spraying exercise of COCOBOD, the Cocoa Livelihood Project by the World Cocoa Foundation and partners and the Sustainable Tree Crops Program hosted by the IITA have all been interventions that have improved farmers' livelihoods in Ghana through the training of farmers on GAP, the provision of loans and subsidized agro-inputs etc. Ghanaian cocoa farmers obtain a base premium for producing bulk cocoa, in contrast to farmers in other cocoa producing countries, without going through the stringent standards of certification with its associated high costs and uncertainties. This justifies the notion that the most important

contribution of RA in Ghana is the strong environmental focus that enhances the natural capital of farmers.

The tendency of conventional farmers to experience decreasing yields could be related to a “poverty trap” where poverty is sustained as it keeps cocoa farmers struggling with gradually higher degradation of the environment leading to low yields and low income resulting in farmers not being able to finance training and inputs that could increase cocoa quality and quantity (World Bank 2011; Hainmueller et al. 2011; Paschall and Seville 2012; Basso et al. 2012; Fountain and Hütz-Adams 2015). Another implication is that certification becomes unobtainable for poor small-scale farmers (Basso et al. 2012). Related to and augmenting the poverty trap and low cocoa yields are issues such as access to quality planting material and other production inputs, technical know-how on cocoa cultivation, disease and pests, as well as land fragmentation and land and tree tenure. These issues can be addressed in the certification process, but collaboration with other stakeholders inside and outside the cocoa sector is needed, such as willingness among banks to allow small-scale farmers to access credit and open savings accounts as suggested by Fountain and Hütz-Adams (2015). The conventional farmers in Akofudi-Abuoho expressed related concerns, reporting that they face a difficult future if no external organizations can help them improve their farming practices and thus their livelihoods.

4. Conclusions

Through a comparison of conventional and certified cocoa farmers, this study shows how Rainforest Alliance certified farmers in the Central Region of Ghana experience substantial positive impacts on their natural and financial capitals from being certified. The inputs from the certification process that have mainly driven the positive impacts were identified as financial support, information and knowledge, technical assistance, and increased access to farm inputs and credit. However, farmers selling certified cocoa outside the certified value

chain may be undermining the certification scheme locally when the initial external financial support runs out and the system has to rely entirely on income from the sale of certified cocoa. The inputs that drive the positive impacts of certification have to be continued in order to sustain the impacts in the future. Thus, it is expected that the extensive positive impacts can only be sustained in the long run if the certified farmers comply with the standards, secure ongoing farmer-capacity-building through active farmers' organizations, and avoid selling to buying companies outside the certified value chain. Additionally, external support is needed from the government and other stakeholders in the cocoa value chain to provide access to fertilizers, agro-chemicals and credit facilities.

Similar positive impacts may be reached by governmental interventions and through other stakeholders, but the strength of RA certification is the environmental emphasis that enhances the natural capital of farmers. Only by continuous evaluation can certification schemes improve the actual field-level impact and increase their credibility to consumers.

4.1. Perspectives

The global demand for cocoa is increasing at a higher pace than production, mainly driven by emerging markets in Asia (ICCO 2014). In order to meet the demand cocoa production has mainly been increased by taking in new areas, and less so through improved yields. Besides being an environmental challenge, the situation has led large food and confectioner companies to secure their supply of cocoa beans through sustainability and quality programs and projects, such as the iMPACT project run by Mars Inc. This augments the role of large international buyers in sustainability efforts through collaborative approaches with international certification organizations such as Rainforest Alliance, and may reduce the role of governments and public institutions in providing a regulatory and political framework for safeguarding and sustaining the broader cocoa sector. In this regard, and given that price premium is often not the main benefit from certification, certification schemes can be

replaced with a regulatory framework that strengthens the natural and financial capitals of farmers – though this requires concerted efforts and capacities that are often not present in many cocoa producing countries. Alternatively, collaborative approaches, where state, business and civil society actors co-develop a sustainable cocoa sector, may be a more viable pathway, as showcased in the example of organic cocoa in Ghana according to Glin et al. (2015). Studies at local and national levels are needed to determine the impact of the industrial collaborative efforts to improve cocoa production on the livelihoods of small-scale farmers, also for those farmers who are not targeted in sustainability and quality programs.

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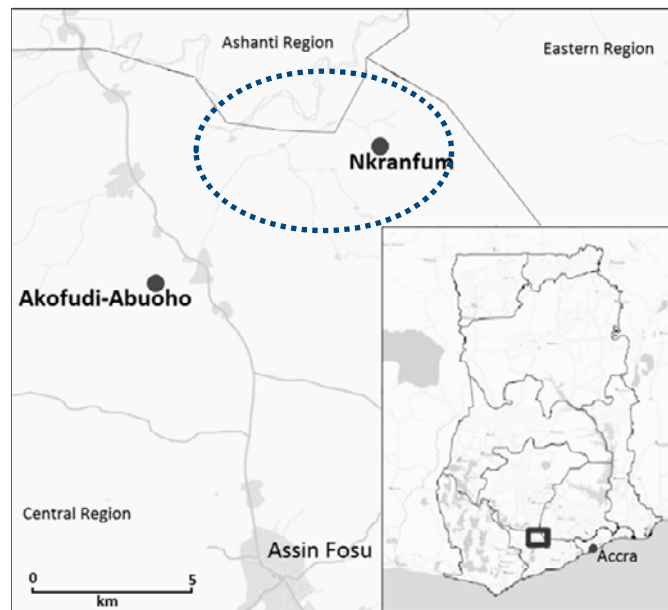


FIGURE 1 Map showing study locations in Akofudi-Abuoho and Nkranfum in the Assin North District of the Central Region of Ghana. The circle indicates the area of the iMPACT project.

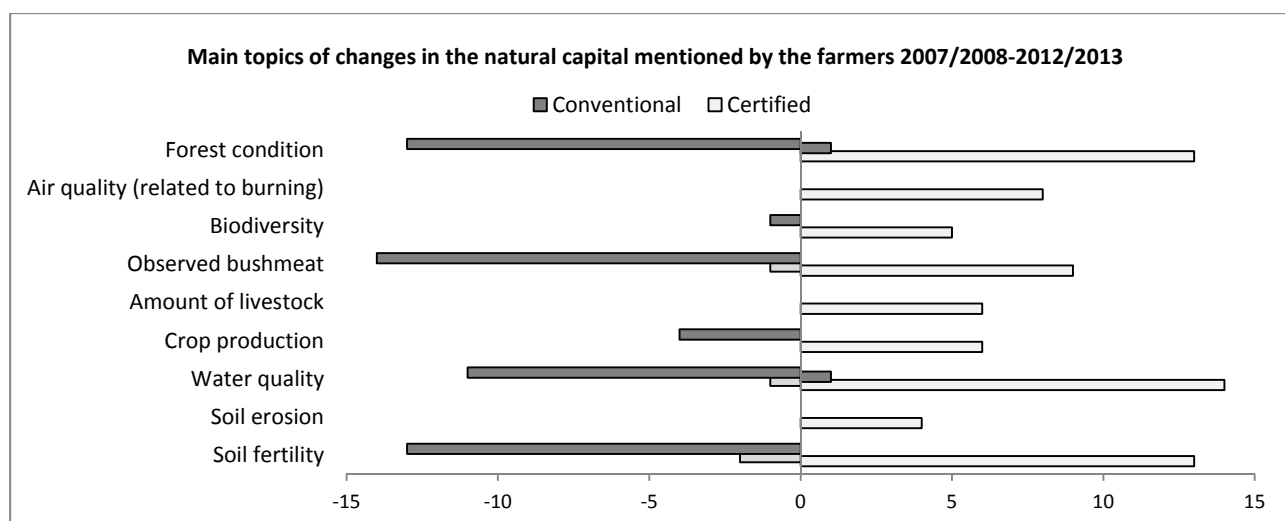


FIGURE 2 Main topics of changes mentioned by the farmers in their natural capital when comparing 2007/08 to 2012/13. Variables are based on optional statements to an open-ended question in the interviews with 15 certified and 15 conventional farmers and the scale shows counts. + indicates an increase or improvement in the condition, and - indicates a decrease or deterioration.

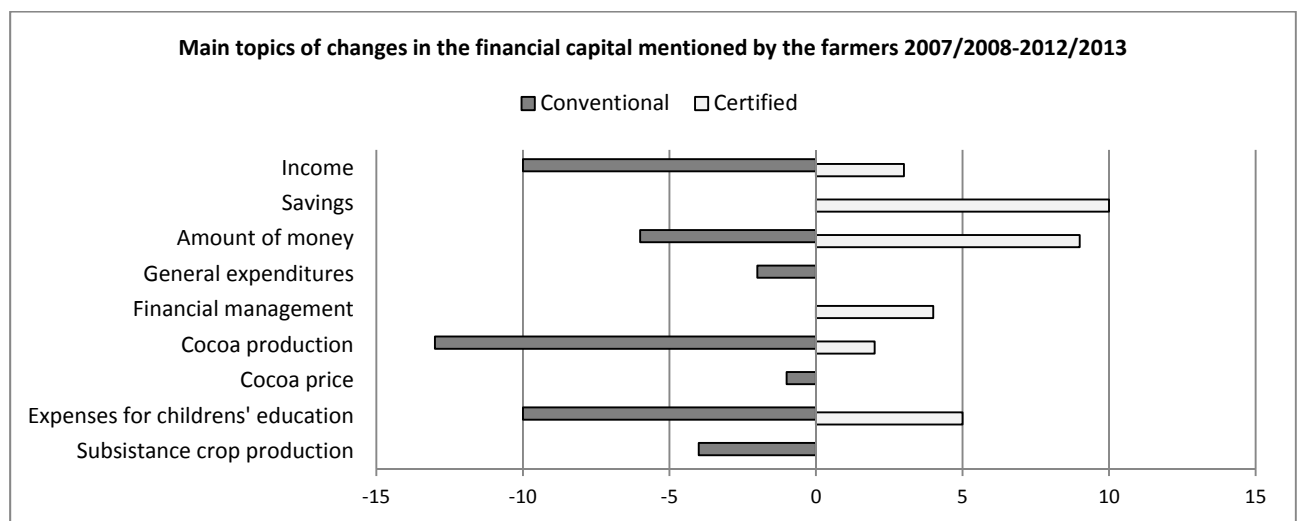


FIGURE 3 Main topics of changes mentioned by the farmers in their financial capital when comparing 2007/08 to 2012/13. Variables are based on optional answers to an open-ended question in the interviews with 15 certified and 15 conventional farmers and the scale shows counts. + indicates an increase or improvement in the condition, and - indicates a decrease or deterioration.

**Figure 4 Assessment of the impacts of RA certification on the natural and financial capitals of the certified farmers.
Collected fieldwork data integrated in an IOOI model.**



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TABLE 1 Descriptive statistics of the household head (HHH), the household and the cocoa farm. * = significant difference for $p < 0.10$; ** = significant difference for $p < 0.05$.

Variables	Certified (n=15)		Conventional (n=15)	
	Mean	S.D.	Mean	S.D.
HHH characteristics				
Age (years)	50.0	(8.38)	46.5	(9.68)
Years of residence in village (years)	29.1	(11.6)	28.9	(11.8)
Landowner (%)	40.0		6.67	
Abunu ¹ (%)	20.0		86.7	
Abusa (%)	60.0		6.67	
Respondent literacy (%)	46.7		33.3	
Household characteristics				
Persons (n)	7.13	(2.20)	6.60	(2.29)
Age <20 (%)	48.6	(0.24)	57.6	(0.28)
Age 20-50 (%)	48.6	(0.30)	40.4	(0.20)
Age >50 (%)	2.80	(0.06)	2.02	(0.05)
Level of education				
Too young for school (%)	5.61	(0.10)	6.06	(0.08)
None (%)	5.61	(0.09)	15.1	(0.13) *
Primary (%)	36.4	(0.26)	44.4	(0.23)
Junior High (%)	29.9	(0.21)	31.3	(0.26)
Senior High (%)	22.4	(0.22)	3.03	(0.08) **
Farm characteristics				
Cocoa farms per HH (n)	2.40	(0.99)	1.80	(0.86) *
Min age cocoa trees (years)	9.80	(5.38)	8.16	(5.40)
Max age cocoa trees (years)	16.1	(6.76)	12.8	(5.27) *
Total size 2007/08 (ha)	2.98	(2.44)	4.06	(2.36)
Total size 2012/13 (ha)	3.47	(2.52)	4.51	(2.28)
Production 2007/08 (kg)	920	(1393)	704	(447)
Production 2012/13 (kg)	1512	(1093)	675	(337) **
Yield 2007/08 (kg/ha)	256	(301)	211	(155)
Yield 2012/13 (kg/ha)	475	(244)	169	(86.7) **

¹ In the abunu system a piece of land is managed by a farmer and the crops are equally divided between the farmer and landowner. In the abusa system the farmer takes 2/3 of the crops. Farmers can manage fields of different ownership types, while the sum of the distribution of ownership types exceeds 100%.

TABLE 2 Overview of changes in the natural capital of farmers comparing 2012/13 with 2007/08 in relation to the relevant SAN-principles: + indicates a positive change, - indicates a negative change, while 0 indicates no change.

Changes in natural capital	Certified	Conventional
Social and environmental management system		
recording of farm activities, production, sale	+	0
storage and final disposal of agrochemicals	+	0
Ecosystem conservation		
state of forest	+	-
deforestation	0	0
no use of burning when preparing land	+	0
agrochemical free vegetation barriers	+	0
native trees/ha	+	-
number of shade trees/ha	+	-
Wildlife protection		
bushmeat and plant species on farm	+	-
hunting of bushmeat (game)	-	-
Water conservation		
water quality	+	-
agrochemical free zone	+	0
waste water management	+	0
Integrated crop management		
weed management	+	0
insect management	+	0
disease management	+	0
Soil management and conservation		
soil fertility	+	-

application of chemical fertilizer	+	+
spread of cocoa pod husks	+	0
prevention of soil erosion	+	0
Integrated waste management		
plastic waste management	+	0
Additional RA-incentives		
higher quality cocoa varieties	+	0
thinning and pruning	+	0

TABLE 3 Overview of changes in the financial capital of farmers comparing 2012/13 with 2007/08: + indicates a positive change, - indicates a negative change, while 0 indicates no change.

Changes in financial capital	Certified	Conventional
Income	+	-
Savings	+	-
Investments	+	0
Financial management	+	0
External support	+	0

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